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in this issue Page

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A Model for Estimating Costs of Government Export Programs for Rice

By Warren R. Grant

PRICE SUPPORT PROGRAMS have influenced domestic price levels for rice since 1954. The effects of these programs on individual rice farmers, on the economy of the rice producing areas, and on the cost to the Federal Treasury continue to concern farmers, program administrators, legislators, and the public. Price support policies for rice are subject to many conflicting forces. The development of a workable price support program involves knowledge of complex economic and institutional factors, particularly the interrelationships of supply and demand in both domestic and foreign markets. Currently more than half the rice produced in the United States is exported.

The purpose of this report is to develop an analytical model of the supply and demand relationships for rice that will permit (1) estimation of domestic and export quantity-price relationships for rice, and (2) determination of the effects of changes in Government programs for rice on the cost to the Federal Treasury. A specific knowledge of the rice supply function is necessary to determine program costs. For purposes of this analysis the supply functions are assumed to be given and thus are completely inelastic for any given year.[1]

Procedure

The method used in estimating both the quantity-price relationships for rice and the cost to the Government was conceived by Mehren and Thuroczy.[2] The general model used is illustrated in figure 1. The domestic outlets for rice are food and industry, seed, and carryover. The sum of the demand schedules for each of these outlets is the domestic demand plotted as the line D_d. The demand for world exports is represented by the line D_w. Supply of rice without allotments is assumed to be represented by the line S_1 and the supply with allotments is illustrated by the line S_2.

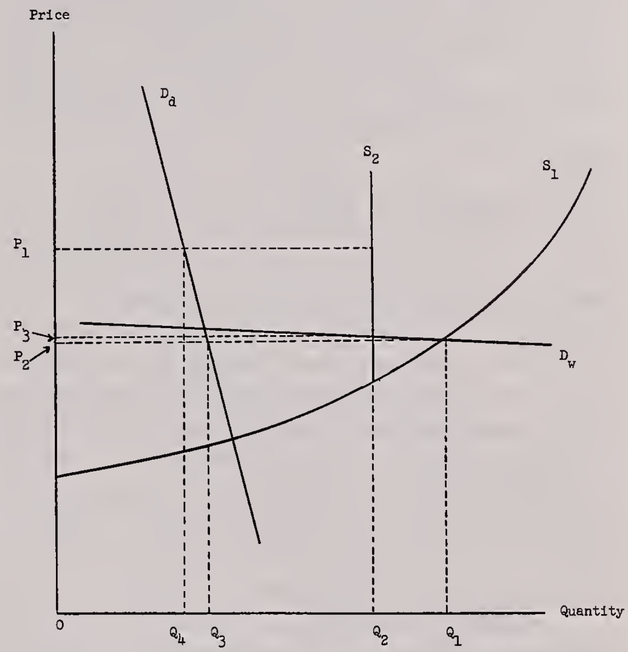

Figure 1.--Equalization of U.S. domestic and world outlets.

[1] A study on aggregate rice supply functions with varying price-allotment levels is in progress.

[2] G. L. Mehren and Nicholas Thuroczy, "The Market for United States Rice: Foreign," Calif. Agr. Expt. Sta., Mimeo Rpt. 163, March 1954.

With the assumed supply and demand schedules and no price support or allotment programs, price would be equal in both the domestic and the export markets at P_2. The total quantity utilized would be Q_1. Under these conditions, sales would be diverted into the domestic outlet only as long as the price level for that outlet exceeded the world price. The remaining supply would be exported. In figure 1, sale of more than the amount Q_3 in the domestic market would reduce domestic prices below the world price level, P_2. An equilibrium condition would result in price equalization in the two markets.[3] Thus, the world price and the factors which determine this price influence the quantity-price relationships in the United States.

To differentiate between two markets when prices are higher in one than in the other, as under certain types of price supports, two conditions must be met. First, the market with the higher price must have the lower elasticity of demand. Second, there cannot be movements from the lower priced market to the higher priced market (no imports). As illustrated in figure 1, these requirements can be met by the model. The domestic demand curve is less elastic than the world demand curve, and imports into the domestic market can be controlled through import restrictions.

If acreage allotments were imposed on producers the supply curve would be limited as shown by the curve S_2. If domestic prices were supported at the level P_1, then the quantity utilized domestically would be Q_4. The remainder of the supply, $Q_2 - Q_4$, could be exported at the price level P_3 (a two-price plan). The quantity $Q_2 - Q_4$ could also be exported at price P_1, given an export subsidy equal to $P_1 - P_3$. In this case the cost of the export subsidy program would be the subsidy ($P_1 - P_3$) times the quantity exported ($Q_2 - Q_4$).[4]

An export subsidy program is a price-supporting mechanism. The subsidy on exports may be equal to the difference between the domestic support price and the "market equilibrium price." A plan in which the subsidy was less than this difference would shift rice into Commodity Credit Corporation loans, if the loans were available. If loans were not available, it would lower the domestic price until it was equal to the market equilibrium price plus the subsidy. Under perfect competition a subsidy larger than this difference would raise the domestic price level above the price support level, reduce domestic consumption, and result in larger quantities exported.

The supply and demand relationships for rice are unusually complex, chiefly because domestic prices, world prices, and utilization in several outlets are determined simultaneously not only by the supply of rice, but also by certain demand-shifting factors outside the rice market structure. The rice market structure for the United States logically can be broken down into four major sets of factors: Those that affect (1) domestic production, (2) world production and price, (3) domestic utilization, and (4) domestic exports (commercial and Government). Each of these has some influence on domestic prices and utilization. However, in those years during which prices are effectively supported by a Government price support program, the domestic prices are assumed to be exogenously determined.

Fox suggests that if a commodity has more than one major market outlet, demand estimates should be made for each outlet.[5] Also, Meinken points out that, under certain conditions, the estimation of elasticity of demand with respect to price for a given outlet by the traditional method of a single regression equation results in a statistical bias. This is true if utilization and price are determined simultaneously by a given set of economic forces.[6] In the rice market with no price supports effectively working, utilization and price are determined simultaneously. However, with Government price support programs setting the domestic price levels, prices could be regarded as predetermined variables in the domestic economy,

[3] The U.S. export price represents the price received at our port of exit. Thus, costs for transfer from U.S. markets to world markets are not included.

[4] Additional costs for administering the program are not included in this analysis.

[5] K. A. Fox, "The Analysis of Demand For Farm Products," U.S. Dept. Agr., Tech. Bul. 1081, pp. 11-14, 1953.

[6] K. W. Meinken, "The Demand and Price Structure for Wheat," U.S. Dept. Agr., Tech. Bul. 1130, p. 37, November 1955.

and single regression equations could be fitted individually to each of the domestic outlets. Price support programs have been effectively determining domestic price levels since 1954, although they have been available continually since 1941. World prices were higher than support prices from 1941 to 1953, and mainly influenced domestic prices in that period. Thus, a problem arises in selecting a time period for an analysis. However, some of the price support activities depend upon export subsidies, the effects of which must be determined in the study. From 1954 through 1958, substantial amounts of rice were placed in Commodity Credit Corporation loans and were not redeemed. Under such conditions the loan program influenced domestic prices. These years are not included in the analysis.[7]

Since 1954, Government programs have exerted a strong influence on carryover stocks. For this reason, carryover stocks were assumed to be exogenously determined and an equation was not fitted to the data for this outlet.

World price is a dependent variable in the world rice market and largely dependent on world demand, world production, and other economic and noneconomic factors. The United States produces only about 2 percent of the world rice production and might be thought to have little influence on world prices, whereas world demand and production outside the United States exert a major influence on world prices.[8] However, more than half of the rice produced in the United States is exported. Since this quantity makes up almost 20 percent of total world exports, U.S. exports do influence world prices of rice if world exports exert a major influence on world prices.

The Model

The economic model developed for this study includes two groups of variables: (1) endogenous variables which are generated by the system that the model characterizes; and (2) exogenous variables which affect the rice market structure but are not appreciably affected by it.

The following variables are assumed to have been simultaneously determined by the same set of economic forces during the years included in the analysis:

Q_{dd} = domestic food and industry utilization of rice (in million cwt. of rough rice).

P_e = average price received for U.S. rice exported less the export subsidy (in dollars per cwt. of milled rice).

P_{es} = export price plus export subsidy on rice (in dollars per cwt. of milled rice).

Q_{se} = domestic utilization of rice for seed (in million cwt. of rough rice).

$Q_{e/us}$ = U.S. exports of rice (in million cwt. of rough rice).

Q_e = total world exports of rice (in million cwt. of rough rice).

The following variables are assumed to have influenced the values of one or more of the endogenous variables during the years included in the study, but not to have been influenced by them to a significant degree during any market year:

Y_I = index of U.S. disposable income per capita (base = 1957-59) (in percentage).

$Q_{w/p}$ = per capita world production of rice (in cwt. per capita of rough rice).

T_1 = time, 1934 equals 1.

P_s = export subsidy on rice (in dollars per cwt. of milled rice).

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[7] After the export subsidy program went into effect there could have been some lag in the response of quantity exported commercially due to the time required to regain markets previously lost. In the model this was assumed to be negligible.

[8] It is very difficult to determine a generalized world price for rice. Traditionally in grains, and particularly wheat, world prices were interpreted as the landed (c.i.f.) price in Liverpool--a major market in one of the major importing countries. More recently, world prices in the aggregate are reflected in the c.i.f. prices at a number of West European ports--Liverpool, Rotterdam, Amsterdam, Le Havre, and Bremen. With increasing exports of rice and other grains to Asia, one also should consider landed c.i.f. prices at major ports, such as Bombay and Japan. Because of differences resulting from the location of exporting countries in relation to importing countries and because of the changing patterns of exports and imports (and the nonexistence of a perfect market), there is no such thing as one standardized world price. This does not preclude use of the concept of world prices but the intangibility of the term should be understood and recognized.

271-137 O - 67 - 2

A_p = U.S. planted acres of rice (in million acres).

Q_s = U.S. supply of rice (in million cwt. of rough rice).

Q_c = domestic stocks or carryover of rice (in million cwt. of rough rice).

$Q_{e/ow}$ = total world exports of rice minus U.S. exports of rice (in million cwt. of rough rice).

The following six structural equations are involved in the system:

(1) $Q_{dd} = a_1 + b_{11} \; P_{es} + b_{12} \; Y_I$

(2) $P_e = a_2 + b_{21} \; Q_e + b_{22} \; Q_{w/p} + b_{23} \; T_1$

(3) $P_{es} = P_e + P_s$

(4) $Q_{se} = a_4 + b_{41} \; A_p + b_{42} \; T_1$

(5) $Q_s = Q_{dd} + Q_{se} + Q_{e/us} + Q_c$

(6) $Q_e = Q_{e/ow} + Q_{e/us}$

Each equation is assumed to be subject to a random error which represents the combined influence of other variables not included in the equation. Since more than one endogenous variable is involved, the first two equations were fitted by the limited-information single equation method, the two-stage least squares method, and the ordinary least squares method. In the first two methods, each equation is handled separately, but the fitting process involves all of the exogenous variables in the system. With the ordinary least squares method each equation is fitted individually without regard to the variables not in the equation.

Table 1.--Estimated coefficients for equations (1), (2), and (4) by method of estimation

Equation number	Method of estimation[1]	$\hat{Y}$	Coefficients for-- P_{es}	Y_I	Q_e	$Q_{w/p}$	T_1	A_p	Constant	$\hat{\delta}^2$	$\bar{R}^2$
(1)....	L.I.S.E.	Q_{dd}	-0.807 (3.30)	0.158 (7.36)					16.704	1.519	([2])
(1)....	T.S.L.S.	Q_{dd}	-.792 (3.24)	.156 (7.32)					16.682	1.514	.869
(1)....	O.L.S.	Q_{dd}	-.723 (3.33)	.151 (7.77)					16.579	1.505	.870
(2)....	L.I.S.E.	P_e			-0.020 (4.02)	-7.251 (2.66)	.188 (4.04)		18.292	.929	([2])
(2)....	T.S.L.S.	P_e			- .020 (4.00)	-7.294 (2.67)	.189 (4.05)		18.320	.929	.861
(2)....	O.L.S.	P_e			- .020 (3.98)	-7.329 (2.68)	.190 (4.07)		18.343	.929	.861
(4)....	O.L.S.	Q_{se}					.020 (10.20)	.992 (24.42)	-.023	.004	.991

[1] L.I.S.E. is the "limited information single equation" method; T.S.L.S. is the "two-stage least squares" method and O.L.S. is the "ordinary least squares" method.

[2] The coefficient of determination for the limited information single equation method cannot be obtained.

Equations (3), (5), and (6) need not be fitted by statistical means since they are identities and do not involve statistical coefficients. Equation (4) can be fitted directly by the ordinary least squares method since all the variables on the right side of the equality sign are predetermined.

Data from 1934 through 1963 were used in fitting each of the equations. Because of the adverse effects of World War II on the rice market, the data from 1941 to 1945 were excluded from the analysis. Also, as indicated earlier, data from 1954 to 1958 were excluded.

Results

The results shown in table 1 were obtained when the equations were fitted by the various methods and for the years noted. The numbers in parentheses under the coefficients show the respective t values. The multiple coefficient of determination adjusted for degrees of freedom is shown for each equation estimated by the least squares method. A corresponding coefficient of determination cannot be obtained from the equations estimated by the limited information method.[9]

The coefficients obtained by the three methods are almost identical, indicating possibly that the bias from the simultaneous effect may be small or may be offset by Government programs or other factors. All of the coefficients have the expected signs and all are significantly different from zero at the 95 percent level. The Durbin-Watson test for serial correlation in the residuals of the equations fitted by the least squares method was inconclusive.

The coefficients in table 1 relate to the original units used for the variables in the analysis. The variables can be expressed in terms of the percentage change in one variable relative to a given change in another variable. These are sometimes referred to as elasticities or flexibilities. Price and income elasticities computed for equations (1) and (2) using 1963 data are shown in table 2. Since the functions were linear the elasticities could be different for other years.

[9] K. W. Meinken, "The Demand and Price Structure for Wheat," U.S. Dept. Agr., Tech. Bul. 1136, p. 40, November 1955.

Table 2.--Elasticities for domestic and world markets estimated by three different methods of fitting equations for 1963 data[1]

Item	Methods of estimating equation		
	L.I.S.E.	T.S.L.S.	O.L.S.
Domestic:			
Demand elasticity	-0.27	-0.27	-0.27
Income elasticity	.68	.67	.65
World:			
World export elasticity	-1.54	-1.54	-1.54

[1] The 1963 price and quantity are on the same basis as used in fitting equations. The elasticities are representative of the demand at the wholesale level.

The indicated elasticity of demand with respect to price (P_{es}) is low, as expected. A 1 percent change in domestic price affects domestic consumption 0.27 percent in the opposite direction. A 1 percent change in income has about 2.5 times the effect of a 1 percent change in price.

The estimated elasticity of demand for exports with respect to export price, P_e, is about 6 times the elasticity of domestic demand. That is, a 1 percent change in export price is inversely related to a 1.54 percent change in quantity exported. When applied to U.S. exports (about 20 percent of total world exports), a 1 percent change in price is inversely related to an 8.2 percent change in U.S. exports. This analysis shows that the "world demand" for rice is more elastic than the U.S. domestic demand for rice.

One criterion for evaluating any economic model is its ability to predict. The calculated values for each method of estimating the equations and the actual values for 1961-63 are given in table 3. The largest difference between actual quantity and calculated quantity of rice

Table 3.--Calculated and actual prices and utilization of rice, 1961-63

Item	Method of Estimating Equations	Unit[1]	Year		
			1961	1962	1963
Estimated:					
Q_{dd}..........	L.I.S.E.	Mil. cwt.	26.63	27.12	27.49
Q_{dd}..........	T.S.L.S.	Mil. cwt.	26.61	27.10	27.47
Q_{dd}..........	O.L.S.	Mil. cwt.	26.52	27.00	27.36
Q_{se}..........	O.L.S.	Mil. cwt.	2.32	2.34	2.37
$Q_{e/us}$........	L.I.S.E.	Mil. cwt.	30.39	34.31	40.69
$Q_{e/us}$........	T.S.L.S.	Mil. cwt.	30.41	34.33	40.71
$Q_{e/us}$........	O.L.S.	Mil. cwt.	30.50	34.43	40.82
P_e...........	L.I.S.E.	Dol./cwt.	6.72	7.00	6.70
P_e...........	T.S.L.S.	Dol./cwt.	6.72	7.00	6.70
P_e...........	O.L.S.	Dol./cwt.	6.72	7.00	6.70
P_s...........	L.I.S.E.	Dol./cwt.	2.06	1.95	3.38
P_s...........	T.S.L.S.	Dol./cwt.	2.06	1.95	3.38
P_s...........	O.L.S.	Dol./cwt.	2.06	1.95	3.38
Actual:					
Q_{dd}..........	-	Mil. cwt.	27.85	26.30	26.73
Q_{se}..........	-	Mil. cwt.	2.33	2.37	2.42
$Q_{e/us}$........	-	Mil. cwt.	29.20	35.10	41.40
P_e...........	-	Dol./cwt.	6.00	6.70	6.80
P_{es}.........	-	Dol./cwt.	8.78	8.95	9.08
P_s...........	-	Dol./cwt.	2.78	2.25	2.28

[1] Quantities are rough rice basis. Export prices are milled basis.

for domestic food and industry (Q_{dd}) is only 4.8 percent or 1.33 million cwt. in 1961. The equation for estimating seed utilization (Q_{se}) is reasonably accurate, with the largest difference between estimated and actual only 2.1 percent or 0.05 million cwt. in 1963. U.S. exports are defined as a residual (exports are taken as all rice not consumed or stored domestically). The largest difference between estimated exports and actual exports ($Q_{e/us}$) is only 4.5 percent or 1.30 million cwt. in 1961. The largest difference in export price, P_e, is 12 percent or $0.72 per cwt. in 1961. In general, the calculated levels of both quantities and prices are close to the actual levels of both.

The calculated export subsidies are below the actual subsidies in each of the 3 years shown in table 4. The difference between calculated and actual subsidies in 1961 and 1962 can be attributed largely to an overestimate of the export price, P_e. In 1963, the difference is slight, but can be attributed to an underestimate of exports. Any of the methods used in fitting the equations produced equations that were equally effective in estimating quantities, prices, or subsidies.

Table 4.--Estimated and actual export subsidies for rice, 1961-64

Item	Methods of estimating equations	Unit	Year		
			1961	1962	1963
Estimated:[1]					
$Q_{e/us}\ P_s$...........	L.I.S.E.	Mil. dol.	45.01	48.11	69.64
$Q_{e/us}\ P_s$...........	T.S.L.S.	Mil. dol.	45.03	48.13	69.66
$Q_{e/us}\ P_s$...........	O.L.S.	Mil. dol.	45.18	48.28	69.85
Actual...............	--	Mil. dol.	56.4	54.6	71.7

[1] U.S. exports converted from rough rice to milled rice on basis of 3-year average (1961-63) conversion rate (71.9 percent).

Application of the Model to Allotment-Price Support Programs

The model can be useful in evaluating (1) allotment-price variations within any price support program, or (2) different types of price support programs. The equilibrium price and quantity, without allotment-price support programs in effect, could be estimated for a given set of conditions. However, a supply function will be needed for such estimates.

Allotment-Price Variations

Estimates of quantities, prices, and export subsidies for a 10 percent change in allotments or prices from the 1963 allotment-price level are given in table 5. Assuming carryover constant, a 10 percent increase or decrease in price or allotment level had little effect on domestic utilization. The price variation affected domestic use more than the allotment variation. However, the maximum change in domestic use for any of the variations was only 0.76 million cwt., or 2 percent of the estimates. The export variation was small for either an increase or a decrease in price. With little change in domestic use and no change in supply, this result would be expected. With exports defined as residual, most of the change in supply brought about by the increase or decrease in allotments is reflected by a corresponding change in exports. Variations in price affected Treasury costs more than similar variations in allotment levels.

Multiple-Price Programs

For comparative purposes, a set of prices is assumed to exist that would make 1963

Table 5.--Estimated Treasury cost of allotment-price changes with 1963 data[1]

Item	Unit	Estimated for 1963	Support price, percent of 1963		Allotments, percent of 1963	
			90 percent	110 percent	90 percent	110 percent
Domestic utilization[2].	Mil. cwt.[3]	35.21	35.89	34.45	35.02	35.38
Exports...............	Mil. cwt.[3]	40.71	40.03	41.47	33.85	47.59
Total subsidy.........	Mil. dol.	69.66	42.02	95.72	54.52	86.23

[1] Two-stage least squares equation used in deriving estimates.
[2] Includes carryover stocks.
[3] Rough rice.

parity prices effective in the domestic market and world prices effective in the export market. The estimated domestic utilization and exports with these prices and 1963 conditions are 32.49 million cwt. and 43.43 million cwt., respectively (table 6). The increase in domestic price would decrease domestic use by an estimated 2.72 million cwt. This net decrease would be exported. With no export subsidy, the only Treasury cost would be the cost of administering the program. However, the consumer would have to bear the $85.12 million additional cost of the price increase in the domestic market.

Table 6.--Estimated Treasury cost of alternative rice programs with 1963 data[1]

Item	Unit	One-price program[2]	Two-price program[3]
Domestic utilization	Mil. cwt.	35.21	32.49
Exports	Mil. cwt.	40.71	43.43
Total subsidy	Mil. dol.	69.66	0
Additional cost to consumer	Mil. dol.	0	85.12

[1] Two-stage least squares equations used in deriving estimates with 1963 data.

[2] Estimate of price support program in effect in 1963, support price at $9.08 milled basis or $4.71 rough rice basis.

[3] Domestic price at 1963 parity level ($12.46 milled basis or $6.46 rough rice basis) and export price at the estimated 1963 world level ($6.68 milled basis).

Conclusions

The price elasticity of domestic demand for rice, as represented by domestic food and industry consumption, was -0.27 for 1963. The income elasticity of domestic demand ranged from 0.68 to 0.65 for the same year. The elasticity of export demand was above unity at -1.54 in 1963.

The derived equations were good estimators of quantities utilized for the years 1961-63. However, the equation for estimating U.S. export price overestimated this price by 12 percent in 1961. All three methods used produced equations that were equally effective in estimating quantities, prices, and subsidies.

The model can be useful in evaluating allotment-price variations within a given price support program, or between two or more types of price support programs. A 10 percent increase or decrease in price or allotment from the 1963 allotment-price level has little effect on domestic utilization. Any change in production brought about by a change in allotment level directly affects exports. The only change in domestic use with an allotment change would be seed utilization. A two-price plan, with domestic price at 1963 parity level and export price at world level, would have decreased domestic use by an estimated 2.72 million cwt.

Several areas in the economic model used in this study need additional research and refinement of data. World production of rice, though predetermined in a given year, depends to some extent on previous prices of rice and on specific governmental policies in each country. An indicator of income appropriate to the quantity of rice consumed in world markets probably would strengthen equation (2).

Research Orientation in Economic Development with Special Reference to Brazil

By Richard G. Wheeler[1]

RESEARCHERS IN economics may like to think of themselves as patient seekers for eternal truth. But their sponsors expect them to produce practical solutions for problems which may be important, but also short-lived. The transitory nature of many current economic problems places limits on the time and funds which can be expended. Researchers themselves need to be practicing economists in adjusting marginal inputs among various activities in a way that will produce more or less proportional benefits.

Although the analysis of problems usually involves the study of past events, few problems can be solved without making predictions about future behavior. Such predictions can sometimes be based upon firmly established principles or laws. Usually, however, the analyst must depend to a considerable degree upon his personal judgment in applying hypotheses which have not been fully tested and supported by evidence about historical behavior or by logical reasoning. Much of his time must be devoted to forming rather specific hypotheses about given situations and subjecting these hypotheses to such logical or empirical testing as may be possible before applying them in making predictions. The basis for making predictions may be very shaky, but without recourse to the best available basis for prediction, the analyst will solve few problems.

As social scientists, we often tend to slight the process of developing a plausible but complex hypothesis through logical reasoning related to all the evidence. Instead, we tend to prefer the more routine kind of activity involved in (a) gathering and summarizing facts, and (b) using such facts to test hastily chosen hypotheses in a historical setting. The results may provide accurate historical description without providing a sound basis for prediction; the possibilities for the existence of spurious correlation have already been well documented. Before one can have much confidence in predictions based on historical behavior, one needs a plausible explanation of why things happened as they did, and a basis for judging whether or not similar factors will operate in the future. The problem solver must emerge from his laboratory with definite conclusions about future behavior, not merely with a collection of relevant or irrelevant facts about past behavior. In other words, he must exercise considerable personal judgment in imputing causal relationship.

[1] Based on a seminar lecture (in Portuguese), May 5, 1967, at Universidade Rural do Estado de Minas Gerais, Vicosa, Minas Gerais, Brazil.

Editor's note: The choice of economic problems and the appropriate combinations of research methods are two basic phases in economic analysis that often receive too little attention. Both are part of the economist's own economic problem in the use of scarce research resources. Some of the most pertinent discussions go on behind the research scene and are not reported. More of these should be preserved. This paper represents an expression of one point of view. It is hoped that this will stimulate more discussion of the issues involved.

The Scope of Development Programs

Development programs are composed of many different elements that have to do with such activities as credit, extension education, minimum prices, technical services, road construction, marketing institutions, colonization, land reform, taxation policies, and many others.

Some of these elements involve changes in direct assistance to existing agricultural producers. Others represent changes of a more

general nature in the institutional environment. Still others involve programs which require public entities to undertake substantial production and marketing operations, in place of private producers and merchants.

The economic research needed to provide extension guidance to individual agricultural producers, of course, would be different from that needed if the government were to manage the marketing of any large part of total agricultural output. Thus, the kind of research to be given priority will depend, in some degree, upon the kinds of activities which are considered to be acceptable elements of development programs.

On the basis of present programs and indications, however, I think it reasonable to assume that Brazil's efforts toward agricultural development will include most or all of the following:

(a) Programs of developing infrastructure to permit penetration and colonization of relatively underdeveloped areas;

(b) Programs of land tenure reform;

(c) Programs of improving marketing infrastructure;

(d) Credit and minimum price programs;

(e) Programs of extension education and technical services;

(f) Programs for integrated community development.

Implications for Research

These likely activities imply that Brazilian agriculture will have a very dynamic character in the future. The geographic concentration of production has changed considerably in past years, and it will continue to change as the margin of cultivation moves toward the interior. Adoption of more intensive cultural practices in the established areas will lead to changes in crop combinations as well as changes in yields per hectare and per head. Relationships among prices of products and inputs will be modified appreciably in many areas, giving rise to additional changes in enterprise combinations and in yields. Flows of products toward the various consumption centers will change rapidly, partly because of changing production patterns, partly because of differential population growth rates, and partly because of changes in processing and other marketing activities.

Under these circumstances, I am very doubtful about the usefulness of research projects which, under static assumptions, seek to produce ideal solutions to complex problems of farm organization, marketing movements, and demand-supply relationships in general.

It is all to the good to develop simplified theories which show the major structural relationships among the various elements of complex economic problems. Such theories can help us avoid major errors in analyzing practical problems and in reaching workable solutions. An economist armed with an understanding of relationships between output and total revenue under conditions of inelastic demand can almost automatically avoid pitfalls that await the layman innocent of economic theory. But economic theory in general has been more concerned with the kind of equilibrium that would prevail in the absence of change than with the process of change itself. Thus, it offers little basis for showing how producers can be expected to behave under constantly changing conditions. Furthermore, some of the most useful theories are best characterized as greatly simplified generalizations about complicated relationships involving many variables; they are not specific formulas which describe the exact mathematical relationships.

Even when problems can be reduced to a set of mathematical equations capable of a unique solution, the quality of available data does not always warrant elaborate analyses. Until the reliability of production estimates by municipios (a Brazilian political subdivision) can be demonstrated with more certainty than has been possible so far, for example, I would be very skeptical about efforts to make refined analyses of optimum distribution of supplies among different markets. Rough-and-ready procedures for making successive approximations toward economic optimums will perhaps be more efficient and productive than more highly refined techniques.

The Operating Unit Approach

To repeat what was said earlier, the problem solver in the social sciences must work rapidly and with limited resources to make predictions

that will help solve complex but transitory problems. A crucial part of his task is to develop plausible hypotheses that are directly and rather narrowly related to specific situations, and that can be useful for prediction, not merely for description of past behavior. This requires efforts toward understanding causal relationships within specific, local settings.

To gain this kind of understanding, a knowledge of the characteristics, resources, goals, and adjustment opportunities of individual operating units is of strategic importance. It is not sufficient to think of agriculture as a large mass of uniform land, plus an army of identical human laborers, plus various quantities of other resources such as fertilizer and tractors--all awaiting directives from a central headquarters which would produce activity in accord with an aggregate Cobb-Douglas production function.

In fact, land is not uniform, laborers are not identical, and management does not emanate from a central authority, in Brazil or in most other countries. Aggregate analyses can be reduced to conveniently simple forms, but they will be unrealistic if they ignore the physical and institutional orientation of the resources involved. These resources are actually organized in thousands of individual operating units, each representing a particular combination of soils, structure, human abilities, and management objectives. It is in such units that the basic decisions about resource use are made. This is the reason for placing emphasis upon the operating-unit approach.

The operating unit may be a family farm, a latifundio, a marketing cooperative, a cotton gin, a wholesaling firm, or a public enterprise. In each case, the operating unit will be managed with a certain limited combination of resources and with certain specific objectives. Some units are operated with the objective of producing the highest return to a given labor force; others with the objective of providing maximum possibilities for employing labor at a modest rate of return; and many are managed with a combination of these or other objectives.

With knowledge of how individual operating units can be made more effective in terms of the chosen goals of society, the government can proceed to change institutions and initiate action programs in a way appropriate to achieving the desired results. Without such knowledge, action programs and institutional changes may fall far short of the mark.

Studies of Operating Units

Considering the large number of interviews which have been made with farm operators and landowners or their representatives in the course of economic research studies in Brazil, there is surprisingly little information available about farm operating units and their characteristics. We cannot even look to the census to provide an accurate estimate of the number of operating units, since noncontinuous parcels under the same ownership and operation are treated as separate units for census purposes. An operating unit may include several ownership units, of course, while, conversely, a single ownership unit may be divided among several operating units.

One does not have to look far to find evidence that countless hours and cruzeiros[2] have been spent in studies of the costs of producing a large number of individual crops. Nearly always, an important share of these costs is joint or overhead costs incurred by diversified producers. Yet seldom can one find adequate descriptions of the total organization and characteristics of the operating units where these cost studies were made. When relatively fixed supplies of land and labor represent the main inputs for producing a combination of interplanted crops, it seems to me that it is much more important to describe the total resources and activities of the operating unit as a whole than to engage in the sterile exercise of attributing costs to the individual products, in an almost wholly arbitrary fashion.

What are the principal characteristics of the predominant kinds of operating units in various parts of the country? Are they specialized, or diversified? Large, or small? Single tract, or multiple tract? Wholly owned, wholly rented, or part owned and part rented? Do they produce both crops and livestock? Is the labor supply mostly composed of permanent workers, or mostly temporary? How intensive is the use of purchased inputs such as fertilizer and

[2] Cruzeiro = monetary unit of Brazil.

pesticides? At best we can answer these questions only in terms of general averages for large areas, and such averages conceal much variation within any one area.

Before we can even begin to answer these questions, we need to decide how to deal with operating units which are considerably more complex than the single-tract, owner-operated farm. Horizontal and vertical integration in agriculture, as in industrial production, gives rise to some very complex operating-unit structures. On many occasions, of course, researchers have wondered whether they should treat a latifundio as a single operating unit or as a series of units operated by individual partners. Presently, one can find interlocking units which are even more difficult to handle. I have frequently cited a case encountered in Colombia, which was structured as follows:

> Producer A lived on a small tract of land owned by his wife, where he carried on a limited amount of agricultural production. He was also the owner of three other plots, in each of which he grew some crops for his own account. In the first of the three parcels, he was also engaged in growing wheat in partnership with producer B; in the second, he was engaged in growing wheat in partnership with producer C and potatoes in partnership with producer D; in the third parcel he grew potatoes in partnership with producer E.
>
> As the landowner in these partnerships producer A provided a share of the seed and fertilizer as well as the land; his partner provided labor, machinery, and the remainder of the variable inputs. Producer B, moreover, was also a landowner, and had separate agricultural activities on his own land, as was also the case for producer D. In addition, producer A grew crops in partnership with two neighboring landowners who were sisters and who possessed separate properties. On still another parcel of land owned by another individual, producer A was also a partner in growing potatoes. Finally, producer A was involved in a partnership for the operation of a tractor. In this partnership, producer A was the owner of the tractor, his partner was the operator, and the two shared in the tractor rental income, including charges billed to producer A for the work on his crops.

First then, we need to evaluate the concept of the operating unit itself, under Brazilian conditions, and develop some meaningful and workable definitions. Next we need to obtain at least a brief description of the principal characteristics of a fairly large number of operating units throughout the country, and classify them into more or less homogeneous groups, area by area. Next we need to reduce the results to a relatively simple map, showing the type or types of operating units which predominate in various areas. In so doing, emphasis should be given to relatively basic characteristics such as size, tenure, and range of production alternatives arising out of the general environment, rather than to the exact combination of temporary crops grown in any one year. If a given area includes several rather distinct types of operating units, one can make many analytical mistakes by treating it as if the units were homogeneous.

Given a type-of-farming area map and simple descriptive information about the type of farms in each area, it is time to analyze management alternatives on individual farms selected, insofar as possible, to represent the various groups. Comparative budgeting is an important technique to be used in such research.

If we know little about farm units, we know even less about the operating units engaged in assembling, processing, and distributing farm products. Considering how little is known about the middleman and the nature of his business, it is amazing how ready we are to blame him for most of the problems of agriculture. We need a great deal more information about marketing channels, margins, costs, and structure, but above all, we need to gather this information in a manner that enables us to understand the characteristics, problems, and alternatives of the operating units engaged in marketing.

Strangely enough, we seem to know comparatively more about the units where agricultural products are finally consumed than we do about the units where production and marketing take place. Nevertheless, our concern with demand elasticities has been such that we might have done a better job than we have of producing simple, direct summaries of what is consumed by families of various characteristics with respect to income, size, and location. Brazil's developing food processing industry has an urgent need for such information.

Other Research Orientations

By giving high priority to studies of the operating units engaged in agricultural production and marketing, I do not mean to belittle studies with other orientations. In fact, one must also attach a very high priority to the straightforward but difficult task of improving Brazil's basic estimates of crops and livestock production, production inputs, and farm prices. Perhaps you do not care to dignify the task of making continuous production estimates with the term "research," but specialized research is needed to find improved means of making such estimates.

With improved statistics on production, prices, stocks, and commodity movements, there will also be an opportunity for a major program of analyzing the agricultural situation and outlook. Two divisions of USDA's Economic Research Service devote major efforts to the situation and outlook work at the national and international levels, and these efforts are reinforced by corresponding work in each of the land-grant universities. Research in depth on individual commodities and other topics supports these comprehensive programs.

There are, of course, urgent needs for many other kinds of research oriented toward individual products, toward individual inputs, toward aggregate problems of individual areas, and toward the more general adjustment problems of the total economy. One could develop an almost endless list, and defend the urgency of many of them. But until we have made considerable progress in describing, classifying, and understanding the operating units engaged in the production and marketing of agricultural products, and until we have much improved aggregate statistics on Brazilian agriculture, many other studies will have a relatively low rating on my list of priorities.

Book Reviews

Economic Policies Toward Less Developed Countries

By Harry G. Johnson. Brookings Institution, Washington, D.C. 279 pages. 1967. $6.75.

THE KENNEDY ROUND of trade negotiations under the General Agreement on Tariffs and Trade (GATT) has come to an eleventh-hour conclusion in Geneva. However, the tumult and the shouting over international trade policies are not going to die. In Geneva the main contenders were the developed countries, especially the United States and the European Economic Community (EEC) countries. The next major contest will take place at the second United Nations Conference on Trade and Development (UNCTAD), now scheduled to take place early in 1968, and the less developed countries will be in the spotlight.

Although the results of the Kennedy Round were still not generally available at the time this review was written, it appears that the less developed countries did get some substantial benefits from the negotiations. However, it is also clear that they remain unsatisfied with the present rules of international trade. In a post-Kennedy Round interview, Raul Prebisch, head of UNCTAD, said that the result has fallen short of the hopes of the underdeveloped countries.

Policymakers, economists, and anyone else interested in a sound discussion of the problems of United States economic relations with the less developed countries should read Harry G. Johnson's book. Johnson discusses the political and economic setting of these issues, the performance of the United States at the first UNCTAD meeting in 1964, and the various policy choices facing the United States with regard to trade and aid issues. He discusses them lucidly, from the viewpoint of an informed, competent economist.

The purpose of Johnson's study is to survey "the major issues raised by UNCTAD for United States policy toward the less developed countries and to explore the various policy alternatives open to the United States..." Johnson says that there is "a real issue, in both political and economic terms." He says that at the first UNCTAD meeting in 1964 the United States appeared to be negative and isolated in its response to the demands of the less developed countries. He emphasizes that, "politically, as the leaders of the Western world, the United States cannot ignore the grievances of the less developed countries or the fact that other developed Western nations do not share its attitude toward those countries' demands. If the United States is to maintain its leadership and fulfill the responsibilities it has assumed to both the developed and the less developed countries, it must evolve some prospective new approach to the problem aired at UNCTAD."

Johnson discusses the alternatives open to the United States in developing a "new approach." He concludes that, whatever is done about trade policy, there probably will be need for increased aid, at least in the short run. He points out that the transfer of real resources from developed to less developed countries could be substantially increased if the existing level of aid were given in the form of untied grants. Although he recognizes the balance-of-payments problem (he has a chapter on International Monetary Reform), he suggests that "...the United States could commit itself to a policy of untying aid as it relaxes its present intervention in international transactions in response to the expected rectification of its balance-of-payments deficit in the next few years." Alternatively, he suggests that the United States might retain aid tying but provide the difference between the cost of aid goods in the United States and on the world market as a grant rather than as a loan.

The author discusses two main alternatives for United States trade policy. One would be a further move toward free trade along the traditional GATT lines of multilateral negotiations, and nondiscrimination among most favored nations, but with particular attention to the problems of the less developed countries. He sees

difficult problems with this approach. Agreement has already been reached in GATT that the developed countries do not expect reciprocity from the less developed countries in reducing trade barriers. But GATT reductions in barriers to exports of the less developed countries still require bargaining on the basis of nondiscrimination and reciprocity among the developed countries. Johnson sees this as "the rock on which the current effort to assist the development through trade of the less developed countries is most likely to founder."

The other alternative discussed by Johnson is to follow the lines of policies proposed by the less developed countries at the first UNCTAD. These involve extension of price-fixing agreements for primary commodities and introduction of preference for exports of manufactured products of the less developed countries. He discusses the arguments for and against both alternatives. He suggests that the administration should appoint "a review committee of economic experts to make a comprehensive study of the economic effects of the United States tariff and the consistency or otherwise of these effects with the domestic and international policy objectives of the United States, including the objective of promoting the economic growth of the less developed countries of the world."

For economists, Johnson suggests a series of problems needing further research, including measurements of the restrictive impact of barriers to international trade, the effective level of protection in processing primary products, the waste involved in aid tying, the elasticity of supply of exports from the less developed countries, the value of trade preference to the less developed countries, and the real value to the less developed countries of price-raising commodity agreements.

Joseph W. Willett

The Economics of African Development

By Andrew M. Kamarck. Frederick A. Praeger, New York. 294 pages. $7.50.

HERE IS A PRAGMATIC book on Africa that makes most books in its field seem obsolete. The author presents a detailed examination of Africa's economic situation with special emphasis on the area south of the Sahara. The role of geographical constraints, climatological aspects, and natural resource development is stressed. The central purpose of this book is to determine what can be done to bring about economic development in Africa. The economic analysis focuses on the following pertinent questions: Why has the economic development of Africa been delayed? Why have the underdeveloped countries remained in a subsistence state until now? How can the geographic, economic, and institutional barriers to economic growth and transformation be overcome?

In a major chapter devoted to agriculture, Kamarck provides a complete reevaluation of the various programs that have been initiated to increase output. Other chapters deal with the importance of mining, the problems of growing industrialization, and Africa's infrastructure needs--in transportation, electric power, communications, and education.

In his evaluation of railway transport in Africa, Kamarck states: "Africa is the only continent in the world where large investments in the construction of new railways are still needed....

"Modern economic development of Africa, then, had to await the coming of the 'iron horse' immune to the tsetse fly and other natural enemies. The bulk of the African resources lay inland and their development could not begin until the railroads made it possible.

"...Africa continues to be the only region in the world, where there is actually a justifiable reason for a large-scale building of railways ... Tropical Africa in 1964 had about 28,000 miles of railway--this for an area of more than 6 million square miles."

In the past, too much attention has been focused on the peripheral problems of economic development and not enough attention on solving and defining basic problems. Kamarck cites Ethiopia as a case in point where reform of the feudal land-tenure system would give farmers the incentive to improve agricultural practices and thus increase the national income more rapidly than various power and road projects that are now under construction.

The author underplays the role and impact of socioeconomic factors in his analysis. The influence of tribalism, the passive attitude of

Africans toward development, and the creation of an incentive for people to work are pressing problems facing Africa today.

Kamarck does not favor marketing boards as a vehicle for economic development in Africa. He states that the entrepreneurial system is a better way of doing things, but unfortunately the developing countries in Africa do not have the entrepreneurial know-how to perform adequately. In all developing countries there should be some type of "regulatory" control of marketing either by statutory marketing boards or by the Ministry of Commerce.

An example of such regulatory action is the Agricultural Products Act in Tanzania under which marketing boards can be established for any agricultural product. These boards have the power to set standards of quality, determine price, and control the flow of commodities to be marketed.

The author distinguishes a type of quasi-rent arising from the wide differences which exist between the superior technological know-how and capital equipment of foreign firms in developed economies and the less advanced techniques and obsolete equipment of local entrepreneurs in underdeveloped countries of the world. He states that "...the degree of difference in the levels of techniques between the foreign firms and that of the indigenous economy helps to determine how long it will take before the catching up occurs and the quasi-rents are wiped out."

Kamarck points out that education and on-the-job training to meet the specific needs of developing countries are vital elements for economic growth and development in Africa. The author's final chapters are devoted to an examination of how Africa's development needs and economic structures affect its domestic and foreign policies. Although this study offers no final answers, it provides some realistic forecasts of how successful Africa will be in meeting its "growth targets." The study also makes some concrete suggestions that could enable Africa to achieve the economic prosperity necessary to become one of the developed areas of the world.

Carey B. Singleton, Jr.

The Economics of Agricultural Development

By John W. Mellor. Cornell University Press, Ithaca, New York. 1966. 403 pages. $10.

PROFESSOR MELLOR has written a much needed book on agricultural development. It should be a useful text for undergraduate courses in this important field.

Professor Mellor describes the general nature of his treatise on agricultural development as follows:

"The book attempts rigor and precision in dealing with the economic development of agriculture, but within a constraint which allows it to be used by both the teacher and the practitioner of agricultural development. The choice of items for coverage and the extent to which the treatment is technical have been dictated by the state of knowledge and by the importance of the subject. The result is of necessity a certain lack of uniformity in regard to coverage and treatment."

The author's comment about the unevenness of coverage is instructive because it reflects to a great extent the lack of economic studies on agricultural development for large areas of the world. It follows that the reader should be cautious in generalizing about all developing nations from the examples contained in this book.

The book is divided into three sections: (1) The role of agriculture in economic development; (2) the nature of traditional agriculture; and (3) the modernization of agriculture. Rather comprehensive treatment is given to each section.

There are several specific points that many readers would take issue with. I do not intend to enumerate the points that bothered me because this would merely detract from the greater significance of the book--the fairly complete and readily understandable treatment of the economics of agricultural development. Nevertheless, the reader should be alert to these debatable portions of the text.

There are two major shortcomings to Professor Mellor's book. First, although he treats well the economics of traditional and developing

agriculture, it is not clear to the reader how a nation gets from one stage to another. The dynamics of agricultural development is missing. The reader is left to figure out for himself how a country goes about putting together in an efficient way the various ingredients (economic policies, physical inputs, institutions, technology, etc.) necessary to develop agriculture. There is no guide to the strategy of agricultural development, or to the business of deciding investment priorities and resource allocations at any point in time and through time as development takes place.

The second shortcoming--and this is related to the first one--is the weak treatment of planning agricultural development, which is the subject of the last chapter. Professor Mellor gives us an oversimplified description of the very difficult process required to plan the growth of large and complex agricultural sectors in developing economies.

Despite these criticisms, this is a good and much needed book.

Martin E. Abel

Agricultural Insurance

By P. K. Ray. Pergamon Press, Inc., Long Island City, N.Y. 299 pages. 1967. $15.50.

RAY IS ONE OF a relatively small number of economists who are authorities in the field of agricultural insurance. His Oxford Ph.D. thesis in 1951 was on this subject and his active interest has continued. For many years he has been a crop and livestock insurance specialist with the Food and Agriculture Organization of the United Nations and has served as adviser to several countries, including Ceylon, Cyprus, Greece, and India.

His new book is a revision of an earlier one, published in 1958, entitled Principles and Practices of Agricultural Insurance. An important objective of the revision as stated in the Preface is to consider "how and in what ways forms of agricultural insurance could benefit developing countries in their urgent need for increasing food and agricultural production." Another aim is to provide "a textbook on the principles of insurance applied to agriculture."

Part I does a good job of presenting the basic principles of risk and insurance. Ray describes the various types of agricultural risks, lists different ways of dealing with them, and explains the nature and function of insurance.

Parts II to V discuss crop insurance, livestock insurance, property insurance, and personal and liability insurance, respectively. Insurance in the United States and the United Kingdom predominates in the discussion, although mention is made of systems in Canada, Japan, and Ceylon.

More space is devoted to hail and all-risk insurance on growing crops than to the other types of insurance. Many readers, especially in the United States, may not be much interested in the detailed discussion of the insurance company's operating procedures and regulations. Perhaps the author believes that rather complete information will be helpful to developing countries if they are to establish similar crop insurance systems. In his final chapter Ray points out that more and more countries are looking to crop insurance as a tool to provide a minimum security to farmers at the production stage.

The discussion of livestock insurance is based mainly on the systems in the United Kingdom and other European countries. Insurance of animals against disease and accidents is apparently more prevalent in those countries than in the United States. Livestock insurance in the United States, which consists primarily of protection against fire and lightning, is mentioned briefly.

The book reflects a thorough understanding of fire insurance used to protect farm buildings and personal property. Ray describes different types of policies, shows how premium rates vary, and discusses some insurance problems such as under- and over-insurance. Special attention is given to the development of farmers' mutual insurance companies in the United States.

Other types of insurance covered in the book are accident and sickness insurance, personal liability, employers' liability, and workmen's compensation. The different types of insurance associated with the ownership and operation of automobiles are not included in the discussion. Although automobile insurance has become widespread in the United States, it apparently is relatively unimportant in most other countries, especially in less developed countries.

A shortcoming of Ray's new book is that some sections are not fully up-to-date, particularly with respect to late developments in the United States. For example, the deductible feature which is being used more and more with windstorm and fire insurance policies in the United States was not discussed, nor was the rapidly spreading package policy for farmowners which combines a number of coverages in one contract. This weakness, however, is not a serious one. Most readers will look at the insurance picture in broad terms and not be concerned with omissions or errors of detail.

Parts VI and VII may prove of greatest value for countries desiring to improve their insurance systems. Different types of private insurance organizations are described and evaluated, with special attention given to mutual and cooperative associations. One chapter is devoted to public-governmental insurance and its advantages and disadvantages. Next the book shows how to measure agricultural risks for the purpose of setting premium rates. The chapter on reinsurance provides a good discussion of the spreading of risks among insurance companies and the possibilities of reinsurance between countries.

The book's final chapter deals specifically with agricultural insurance in newly developing countries. Insurance on crops and livestock is considered to be most needed in such countries because farm loss severely affects financing of future production. Ray says that all-risk crop insurance is by far the most important kind of insurance but the limited financial capacity of new countries and the skepticism as to its feasibility in many quarters hinder its progress. Ray indicates that realization of the need for crop insurance by appropriate authorities hinges largely on current experiments going on in several countries.

"Agricultural Insurance" constitutes a welcome addition to a field in which there is a dearth of literature. It will have value as a textbook and as a reference for those concerned with the practical problems of establishing or improving an agricultural insurance system. Assembling and analyzing insurance information for so many countries was a sizable undertaking. Ray is to be commended on a job well done.

Lawrence F. Jones

Environmental Quality in a Growing Economy

Edited by Henry Jarrett. The Johns Hopkins Press, Baltimore, Md. 173 pages. 1966. $3.50.

TRADITIONALLY, ECONOMIC scholars devoted their talents to solving quantitative problems of natural resources. This is understandable in a developing economy where efforts are directed toward increasing supply to satisfy a perennially expanding demand. Currently, however, there appears to be a shift in emphasis. Although quantitative problems are still very much with us, and no doubt will continue to be for some time, the solution of qualitative environmental problems, such as water and air pollution and rural and urban blight, is becoming of increasing concern.

This book consists of 12 essays, delivered in 1965 at a forum arranged by Resources for the Future to explore problems associated with environmental quality.

Kenneth Boulding and Harold J. Barnett give a comprehensive glimpse of the current and future effects of the development of natural resources on the environment. Boulding questions whether increasing production and consumption are desirable, since they lead to diminishing sources of new material and create problems with regard to disposal of wastes without necessarily adding to total welfare. Barnett doubts whether a competitive, self-regulatory market will be as useful in the future as it was in the past. If their fears are valid, one is led to doubt whether efficiency--an attribute of a free market system--is an unmixed blessing and whether the native ingenuity which caused the increased production and consumption, and overcame so many technical problems in the past, can devise techniques to substitute new resources for depleted ones and to offset the ill effects of waste disposal.

The effects of environment on physical and mental health are discussed by Renee Dubos and Leonard J. Duhl. Even though man appears to have withstood some of the deleterious effects of urban living, Dubos declares that it is still too early to tell whether this is true. Both authors contend that a comprehensive attack on the problem, rather than the piecemeal approach

currently in vogue, is the only solution. However, in this reviewer's judgment, this approach would necessitate massive support including the almost impossible job of coordination. Although the authors fail to mention it, rural areas no doubt have mental health problems caused by the nature of rurality, and the problems are important enough to have warranted some discussion by one of these scholars.

The market mechanism cannot produce the best allocation of resources unless all the side effects--externalities--in the use of natural resources are taken into account. Ralph Turvey and Roland N. McKean explore the characteristics of environmental quality which go beyond the control of the market mechanism. Turvey suggests one of the best methods in dealing with external diseconomies would be a tax. Both economists agree that in the interest of fairness the tax should be applied with caution and only when the gains are believed to exceed the costs.

Allan V. Knesse and M. Mason Gaffney review the state of economic research into problems of the environment. They consider one of the objectives of research to be the illumination of difficult aspects of environmental problems. They review studies of the progress made towards solving the environmental problems and specify the problems that remain to be solved. Gaffney specifically examines these problems in the context of welfare economics. Collective action is recommended, though inherent operational problems are not enumerated.

What are the values involved and the objectives desired in our society? What costs would the public be willing to endure to preserve the values and achieve the goals, and what hinders efforts to change the public attitudes when they obstruct steps necessary to improve the livability of the environment? Gilbert F. White and David Lowenthal discuss the public attitudes on environmental quality. Lowenthal's basic criticism is that man and environmental units are viewed in black and white, without regard to interrelationships, and are thus at the mercy of planners who give the units priority classification. There is some feeling that to analyze environmental preferences in this fashion is wrong. Public attitude towards the environment is largely subjective and is to be enjoyed and not analyzed.

Nortan E. Long and Jacob H. Beuscher examine the improvements needed in policies and institutions to enhance the environment. They review the difficulties in the operations of national, State, and local governments, particularly when interaction is involved. Beuscher suggests some new kinds of governmental machinery that might be used, such as joint boards and compacts for interstate action. Beuscher believes that the larger the governmental body, the more effective it would be in solving problems. For example, State governments should be made substitutes for regional governments in handling environmental problems in metropolitan regions because any one regional unit cannot handle the problems effectively. A question worth asking is why the regional government, despite the virtue of being closer to the problem and more familiar with the environment, is unable to solve the problem more effectively than the State government.

The book is a varied assortment of research findings and recommendations on the current and future state of national resources in the United States. Although by no means definitive, the collection gives the reader a comprehensive orientation on environmental quality by which he can form better ideas as to how to make this land a better place in which to live.

Jack Ben-Rubin

The Grain Trade in the Old Northwest

By John G. Clark. University of Illinois Press, Urbana and London. 324 pages. 1966. $7.50.

BASED ON THE AUTHOR'S doctoral dissertation, this volume represents exhaustive research in contemporary documents and publications, as well as a thorough review of secondary sources related to the subject. It covers the period between the War of 1812 and the Civil War. In the early period, practically all grain went to market by river and canal as products--flour, "provisions" (salted meat), and whiskey. Even earlier, livestock was driven to market, often over long distances. Skillful use has been made of scattered records, often fragmentary, to describe all the factors in the development of the area made up of Ohio, Illinois, Indiana, Michigan, and Wisconsin in a

time of great and rapid change. By the end of the era most of the grain was going to Eastern markets and ports by rail or lake boats.

The book contains much detail as well as a lucid analysis of the picture as a whole. It was the selection for the 1965 Book Award of the Agricultural History Society.

Helen H. Edwards

Reference Manual to Reports of the National Commission on Food Marketing

By Wendell Earle, Gene German, and John Sheehan. National Association of Food Chains, Washington, D.C. 58 pages. 1966. $5.

THIS MANUAL CONTAINS a listing of and indexes to the 10 Technical Studies and the Summary Report of the National Commission on Food Marketing. A total of 2,856 pages making up the studies and report are indexed.

The Sugar Cane: Botany, Cultivation, and Utilization

By A. C. Barnes. Leonard Hill, London, and Interscience Publishers, New York. 456 pages. 1964. $15.

AN ACCOUNT of sugarcane as a major world crop of great economic importance is presented. The first chapter is devoted to the history of the origin of sugarcane and the early development of the industry. While the emphasis is on agricultural aspects of the subject, the importance of organized research, processing of the cane, and use of byproducts receives considerable attention. The author also discusses organization and control of the industry as well as systems of payment to growers by processors. The author's experience with sugar in British colonial countries, most recently Jamaica, is reflected in his treatment of the subject.

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Suggestions for Submitting Manuscripts for Agricultural Economics Research

Each contributor can expedite reviewing and printing his manuscript by doing these things:

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